12.3 Section Exercises

Regression Analysis

Complete the following objectives for each data set.

a. Calculate the sum of squared errors, SSE.
b. Calculate the standard error of estimate, S_e.
c. Construct a 95% prediction interval for the given value of the explanatory variable.

1. The following table contains data from a sample of ten people regarding their weights and the times it took them to run/walk one mile. The times are in minutes and the weights are in pounds.

Construct a 95% prediction interval for time given $x = 175$.

Weights and Times to Run/Walk One Mile

Weight (in Pounds), *x*	178	182	180	165	159	170	189	193	195	203
Time (in Minutes), *y*	13.24	15.32	15.21	12.04	12.21	13.10	16.75	16.98	17.02	17.19

2. The following table contains data from a sample of ten students regarding their final exam scores in the first and second semesters of English Composition.

Construct a 95% prediction interval for the final exam score in the second semester given $x = 70$.

Exam Scores

Final Exam 1, *x*	87	65	99	78	81	86	61	63	90	100
Final Exam 2, *y*	89	72	93	81	75	87	72	69	88	89

3. The following table contains the scores from a group of 15 high school seniors on a psychological assessment of positive affect for the subject of math and their scores on the same assessment for the subject of chemistry. The assessment measures the strength of the student's positive feelings towards the subject on a 40 point scale, with 40 being the most positive.

Construct a 95% prediction interval for score on the chemistry assessment given $x = 20$.

Positive Affect Assessment

Score for Math Assessment, *x*	15	5	32	24	33	20	19	8	12	40	21	15	24	3	10
Score for Chemistry Assessment, *y*	20	9	12	25	38	12	23	10	9	33	22	17	18	5	11

4. The following table contains data regarding golf scores and the average lengths of drives (in yards) for a sample of five golfers.

Construct a 95% prediction interval for the length of the golfer's drive given $x = 72$.

Golf Scores and Average Drive Lengths

Golf Score, *x*	68	72	69	70	75
Length of Drive (in Yards), *y*	275	236	289	245	225

5. The following table contains data from a sample of eight people regarding the average number of fat grams consumed per day and the amount of weight lost (in pounds) over a period of six months.

Construct a 95% prediction interval for the amount of weight lost given $x = 55$.

Fat Consumption and Weight Lost

Fat Consumed (in Grams), *x*	40	20	25	50	65	75	78	80
Weight Loss (in Pounds), *y*	23	30	38	15	10	8	7	5

6. The following table contains data from a sample of eight people regarding a person's physical fitness (measured on a scale of 1 to 10, with 10 being perfectly fit) and the number of days it took for the person to recover from gall bladder surgery.

Construct a 95% prediction interval for the length of the recovery time given $x = 5$.

Physical Fitness Levels and Recovery Times

Physical Fitness, *x*	8	7	6	5	4	3	2	1
Recovery Time (in Days), *y*	5	5	6	7	7	9	10	12

7. The following table contains data from a sample of eight people regarding the number of bowls of chicken soup consumed while having cold symptoms and the number of days the symptoms persisted.

Construct a 95% prediction interval for the duration of the cold given $x = 3$.

Bowls of Soup and Duration of Cold Symptoms

Bowls of Soup, *x*	5	5	4	4	3	2	1	0
Duration of Cold Symptoms, *y*	3	4	3	5	4	5	6	7

8. The following table contains data from a sample of five people and their cholesterol scores before and after taking a cholesterol medication.

Construct a 95% prediction interval for the cholesterol level after medication given $x = 225$.

Cholesterol Level Before and After Medication

Cholesterol Level Before Medication, *x*	220	230	267	200	195
Cholesterol Level After Medication, *y*	154	167	186	132	125

Constructing Confidence Intervals for the *y*-intercept and the Slope of the Regression Line

Complete the following objectives for each data set.

a. Calculate the sum of squared errors, SSE.
b. Calculate the standard error of estimate, S_e.
c. Construct a 95% confidence interval for the *y*-intercept of the regression line.
d. Construct a 95% confidence interval for the slope of the regression line.

Note: *Microsoft Excel can be used to calculate the answers for all parts simultaneously.*

9. The following table contains data from a sample of ten students regarding the numbers of parking tickets they received during one semester and their monthly incomes (including allowances from parents as well as paychecks from employment as income).

Parking Tickets and Monthly Income

Number of Tickets, *x*	10	8	3	2	0	5	4	2	1	0
Monthly Income (in Dollars), *y*	4000	3800	1500	2000	870	2500	1800	1000	1200	1400

10. The following data were collected from a sample of fathers and sons. The heights are given in inches.

Heights of Fathers and Sons (in Inches)

Height of Father, *x*	72	70	73	68	74	73	69	70	75
Height of Son, *y*	73	69	73	70	73	70	68	71	76

11. The following data were collected from a sample of students on the numbers of times they were tardy for their world history class and their final exam grades in the course.

Numbers of Tardies and Final Exam Grades

Number of Tardies, *x*	9	8	7	6	5	2	0
Final Exam Grade, *y*	57	64	69	70	72	84	91

12. The table below shows the heights of clients, measured in inches, and their score, out of 20 points, on a self-esteem test administered by a psychologist.

Heights of Clients

Height (in Inches), *x*	69	68	71	72	68	67	70	75
Self-Esteem, *y*	15	13	17	18	15	14	17	19